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SCAVENGER LOGISTICS
IN SUPPORT OF TACTICAL OPERATIONS

by
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Transportation

School of Advanced Military Studies
U.S. Army Command and General Staff College
Fort Leavenworth, Kansas

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of operations, time, friendly forces, politics, intensity of war, and leadership. Next, the benefits derived from and the costs associated with scavenging are highlighted with some elaboration.

The author concludes that current warfighting doctrine supports the employment of scavenger logistics; in actuality, scavenging is as important today as ever before. With command involvement, tailored organization, reliable coordination, and comprehensive training, a U.S. Army tactical force can sustain itself at least partially by scavenging. Basically, scavenging is a sustainment accelerator that cannot be overlooked by tactical and logistical commanders and staffs when planning and conducting future operations.

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ABSTRACT

SCAVENGER LOGISTICS IN SUPPORT OF TACTICAL OPERATIONS, by Major
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Historical examples of tactical scavenging are cited with emphasis on U.S. Army experiences from World War II to present. Then, current doctrinal publications are assessed in regards to scavenging followed by discussion of the major factors involved in the decision to scavenge: mission, enemy, area of operations, time, friendly forces, politics, intensity of war, and leadership. Next, the benefits derived from and the costs associated with scavenging are highlighted with some elaboration.

The author concludes that current warfighting doctrine supports the employment of scavenger logistics; in actuality, scavenging is as important today as ever before. With command involvement, tailored organization, reliable coordination, and comprehensive training, a U.S. Army tactical force can sustain itself at least partially by scavenging. Basically, scavenging is a sustainment accelerator that cannot be overlooked by tactical and logistical commanders and staffs when planning and conducting future operations.

TABLE OF CONTENTS

	PAGE
I. INTRODUCTION.	1
II. HISTORICAL PERSPECTIVE.	6
III. DOCTRINAL IMPLICATIONS.	12
IV. THE DECISION TO SCAVENGE.	16
V. BENEFITS AND ASSOCIATED COSTS	27
VI. CONCLUSION.	35

APPENDIXES:

A. Conceptual Wholesale Fuel Transport Requirement and Capability Scenario for a Heavy Corps in a Maturing Theater.	A-1
B. Assets to Scavenge	B-1

ENDNOTES

BIBLIOGRAPHY

SCAVENGER LOGISTICS IN SUPPORT OF TACTICAL OPERATIONS

I. Introduction

...it sometimes appears that the logistic aspect of war is nothing but an endless series of difficulties succeeding each other. Problems constantly appear, grow, merge, are handed forward and backward, are solved and dissolved only to reappear in a different guise. In face of this kaleidoscopic array of obstacles...one sometimes wonders how armies managed to move at all, how campaigns were waged, and victories occasionally won.

Van Creveld¹

The United States Army is required to stand ready to perform missions ranging from guerrilla-type operations on the lower end of the warfighting scale to corps- and army-size operations in a high-intensity environment. At any point on this spectrum, the effort requires dedicated sustainment operations. Sustainment of tactical forces is a monumental task, and in the past, the U.S. Army has occasionally failed to varying degrees. General MacArthur decried his lack of resources in 1942 by stating that, "No general can make something of nothing".² During the Battle of Buna, an American general obviously dismayed by his scarce resources and lack of movement capability commented, "Goddam war's gone all old-fashioned on us here!"³ Historically, the onset of war has found the United States ill prepared to support forces despite the natural American desire to win quickly. The resources to support the sustainment functions - manning, arming, fueling, fixing, transporting, and protecting - do not materialize quickly. In World War II, the U.S. developed a crushing superiority in materiel in lavish amounts which no other country

could afford.⁴ The point to remember, though, is that the prolonged nature of World War II worked in favor of U.S. sustainment and allowed the industrial base to gear up. In the 1980's, we may not have this luxury.

Today, our tactical forces may be confronted with a short notice, "out-of-the-motor-pool" war. Ideally, resources should be in place and in sufficient quantities to sustain our tactical forces, but this may not be the case for various reasons. First, our Army is facing a dilemma of peacetime resource constraints amidst outpourings of new, but expensive technological capabilities.⁵ As a result, forces may have technologically superior weaponry but little backup logistical support for the systems. Second, considerable sustainment capability is in our reserve component (RC) force. In a short or "no-notice" war, this force will not arrive in time to have an effect. Third, our corps and divisions are intentionally designed with sustainment voids. For example, divisions are by design required to have wartime augmentation of patient decontamination teams, clothing exchange and bath (CEB) sections, graves registration (GRREG) platoons/sections, and additional recovery vehicle operating personnel.⁶ Fourth, there is an alarming mobility and armor protection differential between our supported forces and their sustaining units. The consequences of this arrangement are that combat forces may outrun or bring into jeopardy the survivability of accompanying supporting units. Fifth, the lethality of the modern battlefield will cause catastrophic losses of men and materiel, and will produce an insatiable demand for

supplies.⁷ Modern weapons have not only become more accurate and lethal, but they have also provided the average combat unit, be it armor, infantry, or artillery, with the ability and enticement to expend its basic load at the initial target array.⁸ Such high expenditure possibilities coupled with anticipated fuel consumption rates will be difficult if not impossible to support. Sixth, it is plausible that in cases where adequate sustainment resources are physically in theater and earmarked for tactical forces, a meager distribution network may not permit the movement of personnel, supplies, and equipment. The required network of roads, navigable waterways, and railroads may be insufficient, degraded, or nonexistent. Finally, since World War II it has become more difficult to sustain a force as battalion frontages and depths of battalion zones have grown sixfold and lines of communication have become longer and more vulnerable.⁹ With this in mind, our tactical and logistical commanders and their staffs must expect sustainment shortfalls and know how to solve these problems.

The Army is no stranger to dealing with shortfalls. In fact, our doctrine is replete with terms that describe and prescribe logistical antidotes when resources are scarce. Terms such as controlled supply rate (CSR), controlled exchange, rationing, cannibalization, priority of effort, intensively managed items, throughput distribution, basic load, prescribed load list (PLL), authorized stockage list (ASL), and "push packages" all speak to this dilemma. These terms also address the more elusive problem of how to be successful at the tactical

level given periodic shortages of supplies and personnel. Colonel Huba Wass de Czege captures the essence of the situation:

The Army must be prepared to fight its battles at the end of long, expensive, vulnerable lines of communications and must anticipate combat against forces armed with ultra modern weapons, deployed in greater numbers, and supported from nearby supply sources. The support required for the highly sophisticated equipment of the forces, high attrition rates, high consumption rates of ammunition, fuel, and other supplies, increased vulnerability of rear support areas on the nuclear-chemical-conventional battlefield, an austere logistical tail, and the high tempo of combat operations combine to complicate the problem of sustaining the force in combat.¹⁰

What sustainment concept will allow the tactical commander to prolong his combat power to preclude "going dry" before the enemy second echelon is upon him determined to exploit a breakthrough?¹¹ What sustainment concept will allow a tactical force to move further and faster than its enemy, as T. E. Lawrence once said, "appearing and disappearing like the mist", thereby magnifying the enemy's uncertainty, disorder, and confusion?¹² What sustainment concept provides the greatest payoff on the battlefield? What sustainment concept provides support to isolated islands of resistance on the battlefield? Unless we begin to resolve these tactical level sustainment and doctrinal issues, the next war may find the U.S. Army at a significant disadvantage.

Mao Tse-tung insists that "To become both wise and courageous one must acquire a method, a method to be employed in learning as well as in applying what has been learned."¹³ With this in mind, the author submits a method - scavenger logistics - to enhance the sustainment of tactical forces prior to, during, and after battle. The purpose of this monograph is to determine

if the employment of scavenger logistics can be a viable alternative or supplement to future U.S. Army tactical sustainment operations.

By the author's definition, tactical level scavenging is the appropriately sanctioned search for and use of resources found within a tactical organization's area of operations to sustain that organization. The concept of scavenger logistics is not new; in fact, it is as old as the world's first armies. The concept has been referred to by various titles: battlefield procurement, tactical foraging, creative tactical sustainment, "living off the land", battlefield "scrounging", last resort survival logistics, large-scale guerrilla logistics, and troop self-help logistics. These terms accurately convey the author's definition of scavenger logistics. On the battlefield, a force can scavenge from other friendly military forces, enemy military forces, friendly nonmilitary sources, and nonmilitary sources in a hostile or occupied territory. The key is that there are alternative sources of sustainment available to a commander to complement his traditional, formal sustainment system.

It is just as important to clarify what the concept of scavenger logistics is not. Scavenging is neither looting nor a violation of the law of land warfare. Scavenging does not necessarily indicate that the formal sustainment system has collapsed. Finally, it is not the sole responsibility of logistical planners and operators. Its degree of utility and success is dependent upon the factors of mission, enemy, area of operations (terrain), time, friendly forces, politics, intensity of warfare,

and leadership. Each of these factors will be discussed in this study.

This assessment of scavenger logistics is aimed at combat, combat support (CS), and combat service support (CSS) commanders from corps to company level including reserve component (RC) counterparts; staff members from corps to battalion level; and, especially small unit leaders. To the author, soldiers and their sustainment resources are not to be recklessly wasted, especially on the battlefield, but must be judiciously used and reused, if possible, until final victory.

The monograph examines historical examples of scavenging with emphasis on U.S. Army experiences from World War II to present and assesses current Army doctrinal publications in regards to scavenging. The monograph analyzes factors which are involved in the decision to scavenge at the tactical level and discusses the costs involved in and the benefits derived from scavenging. Finally, the research question as to whether the employment of scavenger logistics can be a viable alternative or supplement to future U.S. Army tactical sustainment operations is answered with some amplification. In an effort to clarify some major points, graphic aids are provided as appendices.

II. Historical Perspective

Applying Major General J.F.C. Fuller's epigram, "Looking back is the surest way of looking forward", the U.S. Army today can take advantage of learning from the experiences of others rather than only learning by experience.¹⁴ Just as important,

though, the Army cannot disregard Frederick the Great's maxim that "experience is useless unless the right conclusions are drawn from it."¹⁵ Military history is replete with examples of armies that scavenged captured supplies and equipment successfully in order to execute battles and campaigns. The United States Army, too, has scavenged in all its wars, most especially World War II.

The U.S. Army employed scavenging in World War II in both the European Theater of Operations (ETO) and in the Pacific Theater. In the Pacific, the Army used captured railroad equipment, water purification systems, signal equipment, weapons, and foodstuffs.¹⁶ One specific incident occurred in New Guinea where a U.S. technical reconnaissance team secured needed artillery support by disassembling and carrying away a 75mm howitzer while its Japanese crew ate lunch.¹⁷ The collecting, storing, and issuing of scavenged materiel increased in magnitude and importance as the Pacific war progressed.¹⁸

As the U.S. Army had not designed a system to deal with captured and abandoned stocks at the beginning of World War II, the general policy was to let the tactical forces decide the disposition of stocks.¹⁹ During the Normandy invasion, one of the principal uses of scavenged stocks by tactical forces was for intelligence purposes. For example, abandoned German Tiger and Panther tanks were examined closely and vulnerabilities identified; the investigating technical intelligence team then published the list of vulnerabilities and distributed the list in the form of a pamphlet entitled "How to Kill a Panther".²⁰ This

pamphlet later became First Army's tank killing doctrine.²¹ The German Panzerfaust anti-tank gun was sought after by U.S. infantrymen, confirming that battle conditioned soldiers knew a good weapon system when it was used against them.²² U.S. tactical commanders quickly realized during the advance across France in 1944 that offensive action not only degraded the enemy's combat power, but also provided captured reusable stocks as a bonus.²³ General Bradley's G4, Major General (then Colonel) John B. Medaris, put no less than three full ordnance groups to work on rehabilitating captured arms to equip repatriated French forces.²⁴ Soon after Patton's Third Army began the Lorraine Campaign in 1944, his forces became "logistically starved" in that Third Army failed to receive critical logistics support. Immediately, Third Army forces resorted to scavenging fuel from all possible sources, using captured artillery pieces and ammunition and relying on Michelin road maps.²⁵ Eighty percent of the artillery ammunition expended by the XX Corps in the last week of October 1944 was of German origin.²⁶ Scavenging, in the broadest definition, can also apply to manpower. A critical shortage of infantrymen in the Lorraine Campaign forced General Patton to "draft" five percent of other army and corps troops for retraining as infantry; and when bloody fighting along the Westwall sent losses soaring, he "drafted" an additional five percent.²⁷ General Bradley's First Army was at one point so short organic transportation in its advance to the Elbe River that one of his divisions, the 69th Infantry Division, employed no fewer than sixty German sedans, fifty buses, 150 trucks, and 250 trailers.²⁸ Patton and Bradley

resorted to scavenging because it was a proactive measure that would allow a force to continue its mission without sufficient conventional logistics support.

During World War II, captured enemy shipments and installations did augment the formal supply source when properly supervised. Unfortunately, much that could have been used to support the tactical forces was damaged or destroyed through ignorance or vandalism. Prior to the invasion of Germany there were inadequate plans for the use or disposition of abandoned, captured, or civilian supplies, resulting in ineffective use of many valuable stocks.²⁹ Post-World War II recommendations urged the U.S. Army to: (1) investigate future possibilities of the civil sector of a host country or occupied territory becoming a source of supply; (2) stay abreast of the materiel available in countries where U.S. troops might deploy; (3) establish an Army-wide policy on the use of captured, abandoned, and civilian materiel; and, (4) establish a formal troop education program and practical work designed to make soldiers aware of the need to use equipment found on the battlefield and how to use the equipment regardless of previous owner.³⁰

While the U.S. Army was struggling to employ scavenger logistics on the battlefield, the Japanese and Germans were fine tuning their tactical scavenging. Japanese forces relied heavily on captured and abandoned materiel. Despite the experience of World War I, the Germans did not establish elaborate rear area installations at the start of World War II because they planned for short blitzkrieg campaigns and expected to "live off the

land" in their conquered territories.³¹ Trained technicians accompanied the field army to exploit the conquered nations' economic systems for Germany's benefit.³² In essence, the Japanese and especially the German tactical forces relied heavily on enemy materiel to sustain themselves.

Again, the United States was not prepared to fight and sustain a war in June, 1950, and Korea was at the end of a long line of communication. Luckily, occupation forces still in Japan could respond and considerable stocks of materiel were on hand in U.S. facilities there. Research reveals no well organized scavenging during the Korean War; however, this does not mean that scavenging did not take place - quite the contrary. John Westover, in his book Combat Support in Korea, cites numerous examples of individuals and units exploiting abandoned, captured, and civilian assets in order to execute a mission or just to survive on the battlefield. For example, 7th Infantry Division used a ten-mile-long mine-conveyor system to transport 55-gallon drums of fuel.³³ A signal officer displaced his communications terminal in a North Korean firetruck and a 1½-ton truck.³⁴ The 2d Infantry Division relied on captured railcars, locomotives, and POW labor to move supplies, while 5th Cavalry soldiers laid recaptured U.S. signal wire.³⁵ At Inchon, X Corps used all port facilities including ship berths, causeway, harbor pilots, and rail net to sustain the amphibious landing. What matters here is that even without stated Army policy on scavenging, tactical forces resorted to scavenger logistics out of necessity.

Generally, during the Korean War and the Vietnam War there was only limited use of captured enemy supplies and equipment by U.S. forces. With a few exceptions such as the Soviet RPG-7 in Vietnam and recaptured items in both wars, most captured and abandoned supplies were destroyed in place or evacuated if transportation was available. While there was minimal need for the captured assets by U.S. forces in both Korea and Vietnam, the enemy forces in each instance used captured supplies and equipment to sustain their war efforts.³⁶

During Operation URGENT FURY, U.S. Army tactical forces were inserted into Grenada with minimal planning and preparation time. As a result, the forces found themselves in need of certain supplies soon after they arrived. For example, engineering supplies were required for the construction of prisoner of war (POW) cages and support facilities. LTC L. L. Izzo, the 307th Engineer Battalion commander, 82d Airborne Division, quickly solved this problem by purchasing plywood, cement, and assorted supplies from the local economy.³⁷ In addition, commercial dump trucks and other pieces of engineer equipment previously employed in the construction of the Port Salines airfield were seized and employed by the 307th Engineer Battalion.³⁸ URGENT FURY thereby demonstrated, among other things, that the formal sustainment system and scavenging can coexist in harmony. One can complement and supplement the other for the benefit of the entire force.

According to Colonel Huba Wass de Czege, "Battles are not always won by the commander who brings the most in capabilities to the battlefield. Very often they are won by the commander who

can make the most effective use of what he has."³⁹ Colonel Wass de Czege continues, "The successful ones [commanders] tend to waste far less. In a war with Russia we cannot afford to waste capabilities. If we can bring our capabilities to bear fully, the enemy loses his apparent preponderance."⁴⁰ In this vein, U.S. military history supports the concept that our Army can increase its battlefield sustainment capabilities by incorporating a scavenger logistics approach into our current warfighting doctrine.

III. Doctrinal Implications

War is the infallible testing field where the teachings and interpretations of the principles of the conduct of war and of combat which have been elaborated in peace time are tested and where the entire formation of leadership and troops can prove whether or not it has been established on a basis of reality...There is nothing more fatal for a soldier than to consider as right the ideas once accepted, without proving whether what was once recognized is still valid or is merely endorsed by habit.

Field Marshal General Ritter von Leeb⁴¹

According to FM 100-5, Operations, "An army's fundamental doctrine is the condensed expression of its approach to fighting campaigns, major operations, battles, and engagements. Tactics, techniques, procedures, organizations, support structure, equipment, and training must all derive from it."⁴² For doctrine to have utility, it therefore must be understood and applied. If our fundamental doctrine is rooted in time-tested theories and principles, and previous research indicates that scavenging is a time-honored method of tactical sustainment, then our warfighting doctrine should allow for scavenging. It does.

First, the employment of scavenger logistics is compatible with FM 100-5's emphasis on flexibility and speed, mission orders, initiative among commanders, and especially, the spirit of the offense.⁴³ FM 100-5 speaks to the tactical commander's need for self-sufficient CSS forces; scavenging would assist in this. FM 100-5 emphasizes that our forces must expect to fight in or near population centers which contain services, supplies, facilities, and labor resources available for exploitation through scavenging.⁴⁴ FM 100-5 states that unforeseen contingencies will arise in every conflict which mandate that normal procedures be suspended, unusual sources of supply and transportation exploited, and exceptional risks accepted.⁴⁵ Scavenging can lessen the risk.

Second, U.S. Army sustainment doctrine found in logistics publications supports the concept of scavenger logistics. FM 63-3J, Combat Service Support Operations - Corps, suggests that CSS planners must not be tied to the traditional methods of support.⁴⁶ FM 63-2-2, Combat Service Support Operations - Armored, Mechanized, and Motorized Divisions, further suggests that U.S. forces must make the most of what they have; this includes taking full advantage of host nation resources through preplanning, ad hoc measures undertaken during operations, and foraging and use of captured enemy materiel.⁴⁷ FM 701-58, Planning Logistics Support for Military Operations, asserts that logistics support must be designed to produce the most effectiveness through conservation and use of local resources.⁴⁸ FM 31-20, Special Forces Operational Techniques, provides detailed information on scavenging techniques for special forces;

however, similar methods are just as applicable to units of a larger conventional force.

Third, civil affairs publications contain numerous references to scavenging. For example, FM 41-10, Civil Affairs Operations, delineates the G5/S5/civil affairs (CA) team functions, one of which includes the identification and procurement of local goods and services for military use from corps to brigade level.⁴⁹ This civil affairs linkage to scavenging is critically important to an effective sustainment system in either a mature or immature theater of operations.

Fourth, FM 27-10, The Law of Land Warfare, contains provisions which are designed to regulate the conduct of armed hostilities on land.⁵⁰ Fortunately, it provides latitude for tactical forces to scavenge with controls. The controls are taken into account by the author's definition of scavenging (i.e., the appropriately sanctioned search for and use of resources found...). For example, looting is not sanctioned by the law of land warfare; therefore, it is not scavenging by definition.⁵¹ In accordance with the law of land warfare, a belligerent exercises authority over all means of transportation, both public and private, within an occupied district, and may seize them and regulate their operation.⁵² The occupier has the right to regulate commercial intercourse in an occupied territory, and may subject such intercourse to such prohibitions and restrictions as are essential to the purposes of occupation.⁵³ All enemy public movable property captured or found on a battlefield becomes the property of the capturing State.⁵⁴ A detaining

power may use the labor of prisoners of war who are physically fit; however, limits are set as to what type of work is authorized.⁵⁵ All movable property belonging to the State susceptible to military use may be seized and used for the benefit of the occupier's government.⁵⁶ In addition, FM 27-10 contains provisions for requisitioning services such as medical care from civilian hospitals and describes the requisitioning techniques acceptable under the auspices of the law of land warfare.

Finally, international agreements among allied forces help standardize employment and coordination of scavenging. The signing nations adopt the procedures and incorporate them into doctrine and procedural publications. Scavenging must be in accordance with binding treaties and agreements. Nations such as West Germany and South Korea provide advisory teams to U.S. tactical commands to assist in identifying and acquiring local supplies, equipment, and services.⁵⁷

Based on review of FM 100-5, key logistics publications, FM 31-20, FM 41-10, FM 27-10, and a host of supporting documents, there appears to be doctrinal support for the employment of scavenger logistics at the tactical level. Given this doctrinal support, one must question whether the Army has become so sophisticated in its methods and technologies that scavenging is no longer an effective sustainment option. At first glance, it appears that the development of new systems and associated doctrine has been too rapid for scavenger logistics to keep pace. This is not totally correct. The non-technical arena remains open to exploitation. For example, fuels, trucks, labor,

subsistence, and construction supplies can be scavenged now as in the past. On the other hand, it appears that high-technology supplies, equipment, and services will be difficult to scavenge on the battlefield. In actuality, high-technology scavenging is a reality and can pay great dividends. To cite several examples, privately owned or government operated air traffic control facilities, telecommunications centers, electric power plants, water purification plants, port facilities, and refineries can be requisitioned or seized by U.S. tactical forces. Granted these scavenged assets may have more operational or strategic value than tactical, but tactical forces also will be served. In addition, high-technology items can be scavenged from enemy forces. Captured electronic warfare assets may be of great value to the military intelligence units at division and corps level.

Scavenging has its roots in antiquity; however, it can be a "new frontier" in sustainment of tactical operations even considering the sophistication and complexity of armies today. Fortunately, our doctrine supports and encourages tactical scavenging. Unfortunately, the decision to scavenge and all that implies is not as simple as one might expect.

IV. The Decision to Scavenge

To exploit and profit fully from scavenger logistics, the sanctioning of tactical scavenging cannot be an ad hoc and spontaneous decision. Considerable planning and preparation must precede its execution if optimal effects are to be realized. The results, however, may vary among operations

and there are specific conditions that tend to limit or amplify the effects of scavenging. The decision to employ scavenging at the tactical level depends upon the factors of mission; enemy; area of operations; time; friendly forces; political, legal and ethical considerations; intensity of war; and, finally leadership. Each variable is worthy of discussion.

Mission

Mission is the overriding consideration in any operation. This coupled with the higher commander's intent establishes the goal for the force. To support the mission, adequate sustainment resources must either accompany, follow, or precede the force; be scavenged by the force; or be provided by some combination of all. The mission may dictate the expected duration of the operation, and generally dictates the size and composition of forces to be employed. These mission factors weigh heavily on the scavenging decision. If a guerrilla force is inserted into an area of operations (AO) with a particular mission, the force may require only minimal sustainment coming from some combination of "living off the land", requisitioning from a local population or an unwilling enemy, and a sponsoring indigenous organization.⁵⁸ If a larger conventional force is inserted into an AO with a particular mission, the force's sustainment concept may be similar to that of a guerrilla force. Conceptually, a light infantry force can be inserted into an AO, sustain itself by scavenging (except items such as unique communications equipment, repair parts, weapon systems, and ammunition), and accomplish its mission.

Enemy

In planning for scavenging, the enemy dispositions, equipment, doctrine, capabilities and intentions must also be analyzed. Generally, scavenging pays the greatest dividends while U.S. forces are on the offense opposed by a weak, disorganized adversary. A determined enemy disposed in sufficient strength obviously reduces the opportunities to scavenge captured and abandoned materiel.

The quantity and quality of enemy materiel will determine the emphasis on scavenging. If an enemy possesses modern weaponry in sufficient quantities to affect the relative combat power ratios, scavenging is critically important. U.S. forces can scavenge by capturing and rapidly reusing the materiel against the previous owner or by evacuating the materiel to the rear. Forces may choose to destroy and deny this materiel for further use by any force. One can argue that scavenging is the preferred option in an ideal sense. If an enemy's materiel is considered inferior to that of the U.S. tactical force, then it is a natural assumption that the enemy will attempt to scavenge U.S. materiel. The U.S. must thus take actions to deny enemy scavenging.

The enemy's doctrine must be analyzed since all nations do not think alike militarily, and their doctrines are influenced by various national factors.⁵⁹ For example, two basic Soviet logistics principles advocate the use of captured stocks and an ambitious vehicle recovery program.⁶⁰ This implies that the Soviets will scavenge on the battlefield and, more importantly,

will attempt to deny their adversary the opportunity to scavenge. The Soviet operational maneuver group (OMG) should, to an extent, be able to "live off the land" and exploit civilian fuel resources (Soviet fuel engineers have special pumps for this purpose) and captured supplies.⁶¹ If the U.S. meets the Soviets on the battlefield, our commanders will be opposed by master scavengers.

The capabilities and intentions of an enemy impact upon scavenging. Our commanders and planners must know if the enemy is capable of moving quickly, repairing damaged materiel rapidly, and resupplying his forces while denying U.S. forces the same opportunities. Our commanders must know if and how the enemy can recycle his combat power for us to guard against it. The key, however, is to identify what the enemy has that can be used by U.S. forces.

Area of Operations (AO)

The AO for a tactical force often determines the degree to which scavenging can be employed as it can be in either friendly or hostile territory. Obviously, there are distinct advantages in conducting operations in a territory occupied by a friendly population. The acquisition of sustainment such as transportation, medical services, labor, supply, and facilities is generally expedited in an atmosphere of mutual cooperation. Operating in a hostile territory necessitates requisitioning and seizing sustainment resources which in turn may require extensive security measures to prevent sabotage.

Second, the AO can be considered either resource-rich or resource-poor. Urbanized and industrial nations are generally

resource-rich as are areas that contain large quantities of enemy supplies and materiel susceptible to capture and reuse. Other territories may not possess indigenous or enemy resources capable of supporting a modern tactical force, and thus would be classified as resource-poor.

Third, the geographical location of an AO influences scavenging. If a particular AO is isolated, at the end of a long line of communication (LOC), and surrounded by territories inaccessible to U.S. forces, scavenging may be the primary means of sustainment for our forces. In areas such as this, the mission may not be supportable unless scavenging is planned well in advance.

Finally, the AO can be in either a mature or an immature theater of operations. The mature theater of operations offers numerous advantages such as previously coordinated sustainment schemes. In an immature theater, a newly arrived tactical force without prearranged logistics capability may be forced to scavenge immediately to survive.

Time

Time is a critical and unforgiving consideration when planning and executing an operation. Generally, increases in U.S. sustainability do not accrue quickly, and scavenging can reduce the gap between the demand for and supply of sustainment to a point. To take full advantage of scavenging, time must be provided to plan and prepare for its employment. An ad hoc decision made on the spur of the moment to sustain a force by scavenging will not have a favorable outcome unless that force has been conditioned through training in a scavenger sustainment

environment. Time, tempo of battle, and the effectiveness of scavenging are inextricably linked. If the tempo of battle is fast, then time may not be available to sustain adequately a force from its formal base, increasing the need for scavenging. If the tempo is slow, then both the formal system and scavenging can be exploited. Scavenging itself is time-sensitive because of the perishable nature of some sources. Assets not scavenged quickly may be bypassed, consumed by a follow-on unit, destroyed, or left for the enemy when you are displacing.

Friendly Forces

Scavenging should be a coordinated action between friendly units. For example, when an armored division is preparing to pass through a mechanized division and conduct a pursuit operation, the mechanized division may be scheduled to revert to corps reserve afterwards. It is likely that sustainment resources such as ammunition, fuels, barrier stocks, and canned food could be transferred from the mechanized division to the armored division. In addition, the mechanized division could provide temporary use of its ammunition transfer points (ATP's), fuel system supply point (FSSP), ration breakdown points (RBP's), medical facilities, air head, and movement control assets to the armored division. It is also plausible that coordination take place between the two forces so that the armored division is aware of the previously scavenged assets available to it. The armored division could decide to use these scavenged assets or the assets could be disposed of by the mechanized division to prevent further use by the enemy. These scavenged assets create opportunities to recycle sustaining power

which in turn generates more combat power. In addition, the level of troop discipline, unit cohesion, morale, and training impacts upon the ability of a force to accept the scavenging approach and to employ it.

Political, Legal, and Ethical Considerations

Politics, law, and ethics impact upon the decision to scavenge. It will be a political decision whether to mobilize the U.S. Army's reserve component where most sustainment power rests. If the National Command Authority (NCA) and Congress authorize this mobilization, significant sustainment capability becomes available to provide for continuous logistical support.

In some instances, allies can provide sustainment to U.S. tactical forces on either a prearranged or "no-notice" basis. If the U.S. participates with one or more allies in an operation, the U.S. can be provided fuels, transportation, possibly ammunition, facilities, services, and more from its partners. Interoperability of equipment, command and control, weapon systems, ammunition, training, and doctrine presents challenges in any coalition. Interoperability training among allies in peace, however, leads to more effective cooperative sustainment in coalition warfare.

Allied and world opinion can effect scavenging. For example, a crisis occurs somewhere in the world which has national security implications. At the request of a ruling government, the U.S. inserts a brigade-size force into an urban area to restore peace. The U.S. tactical commander may requisition resources from local merchants who are opposed to the ruling government. A

local opposition party may then accuse the U.S. of "pillaging and looting" the community, and U.S. forces receive "bad press" worldwide. Although hypothetical, this type of incident indicates the sensitivity of scavenging as it may easily be labelled as "pillaging and looting".

The commitment and will of a threatened population, whether in a friendly or enemy territory, affect scavenging. If the population in a friendly sector is committed to victory, then U.S. forces should receive more local sustainment than if, under similar circumstances, the population is apathetic. If the population in a hostile territory is disillusioned with its present regime, it may also provide local sustainment to a U.S. force. Current intelligence can assist commanders and staffs in determining the degree of resistance or assistance to be expected, and the attitude of the indigenous population must be taken into consideration when planning tactical operations.

Determining the legality of events in war is frequently difficult. In an effort to clarify these issues, conventions such as the Geneva-Hague Convention assist warring states. International agreements, treaties, memoranda of agreement and understanding also establish rules; however, there are areas open to interpretation such as the issue of "military necessity". In accordance with FM 27-10, The Law of Land Warfare, military necessity is defined as that principle which justifies those measures not forbidden by international law which are indispensable for securing the complete submission of the enemy as soon as possible.⁶² It is important to note that "military

necessity" has been generally rejected as a defense for acts forbidden by the customary and conventional laws of war.⁶³ Commanders and their staffs must be aware of this legal issue when conducting tactical operations and providing sustainment to their forces by scavenging.

Scavenging may on occasion present ethical dilemmas. For example, a U.S. unit may be preparing defensive positions near a town in a friendly territory, but the unit has no supporting engineers. Civilians may be using their limited construction equipment to clear rubble as the local authorities search for people trapped in buildings. You need the equipment; however, you also know that many civilians will certainly die if you requisition all the equipment. If you do not use the equipment, your soldiers' lives are in greater jeopardy. This is a dilemma U.S. forces must be prepared to face and resolve.

Intensity of War

The intensity of war at the tactical level affects scavenging. Low intensity warfare provides the U.S. force with opportunities to employ guerrilla-type logistics. Some combination of (1) a sympathetic population, (2) an unwilling enemy, (3) a sponsoring indigenous organization, and (4) a local or national government combine with the U.S. logistics base to sustain the force. As low intensity warfare escalates to mid-intensity, the complexity of scavenger logistics changes somewhat. Generally, conventional mechanized forces enter combat requiring larger quantities of supplies, equipment, and services, a greater portion of which cannot be routinely supplied by scavenging.

Scavenging is still critical though, in that it can fill some sustainment shortfalls. A problem of recovering excessive amounts of scavenged resources may be experienced. It may be unrealistic to expect company, battery, troop, battalion, squadron, brigade, and group commanders to recover not only their disabled weapon systems, but captured and abandoned materiel as well in a mid-intensity environment. Even higher level organizations may be limited in "policing" the battlefield by scarce recovery and evacuation assets. In a high-intensity conflict, scavenging remains critical to replace catastrophic losses in materiel. In any case, scavenging may be a major factor that allows a force to survive and fight the next battle.

Leadership

An important yet possibly least understood aspect of scavenging is leadership. Good tactical and logistical leaders tend to generate more sustaining power than poor ones. Good leaders must understand the full capabilities of the units they command, especially attached and operational control (OPCON) units, in order to avoid the assignments of missions which are beyond the units' capabilities or do not apply the full range of the units' strengths, resulting in inefficient force application.⁶⁴ According to FM 100-5:

The most successful commanders have been those who pressed their operations to the very limit of their sustaining power - but not one step further.⁶⁵

Leaders must not ignore the logistical support available from abandoned or captured enemy supplies; abandoned, salvaged, or transferred friendly stocks; or civilian resources. These

leaders must anticipate battlefield "friction" which is the accumulation of chance errors, unexpected difficulties, and the confusion of battle.⁶⁶ They must excel in reading the battlefield and not miss fleeting opportunities to achieve success. The keys to sustainment incorporating a scavenger logistics approach are thoroughly understanding the tactical concept of operation and providing responsive support to each element of the supported force.⁶⁷ Good leaders inculcate in their forces a sense of supply discipline. This in itself can prolong the units' combat effectiveness especially when scavenging resources are limited.

More conservative and traditional leaders may reject the employment of scavenger logistics with the excuse that it will be required only under abnormal circumstances; however, abnormal supply flow may be the norm on a given future battlefield. To some leaders, employing scavenger logistics may be regarded as an aberration that need not be sanctioned even though it has been used by the U.S. Army in all of its wars and is encouraged by current Army doctrinal publications. The battlefield is expanding in size while units are generally becoming smaller, more self-contained, and more compact.⁶⁸ This implies that battle is fought by sergeants, lieutenants, and captains with existing resources until resupplied. Scavenged resources can help, and leaders may be courting disaster to rule out and not train for scavenging on the battlefield.

Scavenging is as much a matter of attitude as a concept of sustainment. For scavenging to be successful, leaders must be

imaginative, resourceful, and capable of issuing simple directions. Bonds must exist between tactical and logistical leaders, tactical leaders and their subordinates, and logistical leaders and their subordinates. These bonds include a common objective, trust, and sense of cooperation which will help overcome risks involved in scavenging and alter the assumption that all sustainment comes only from the rear.

V. Benefits and Associated Costs

In a generic sense, scavenging allows tactical and logistical commanders to prevent, reduce, or eliminate sustainment shortfalls caused by any number of factors. In addition, scavenging provides benefits which will multiply combat effectiveness of a tactical force while degrading that of the enemy. Depending on the magnitude of the scavenging effort employed, however, certain costs are incurred. The benefits and associated costs in scavenging are highlighted here.

Benefits

Scavenging complements AirLand Battle doctrine in that it assists in preserving a commander's freedom of action by allowing more opportunities to react rapidly, unpredictably, and violently on the battlefield. It permits the commander to capitalize on the four basic tenets - agility, initiative, depth, and synchronization. Scavenging tends to reduce the sustainment burdens associated with specialized forces such as long-range reconnaissance patrols (LRRP's), stay-behind forces, and airborne elements. If a tactical force is ever encircled by an enemy on

a non-linear battlefield, scavenging will become necessary for sustainment prior to and during breakout and linkup operations.

No new force structure changes are required to implement an aggressive scavenging concept that relies either partially or primarily upon the enemy, other friendly forces, and the civilian sector for sustainment. Tapping these additional sources provides the opportunity for redundancy in sustainment in what may be an austere logistical environment. This redundancy permits a buildup of reserve stocks to meet anticipated and unexpected surge requirements. With scavenging relieving pressure on the formal supply system, more emphasis can be given to those items and services that are not conducive to scavenging. These attributes combine to facilitate the conduct of tactical operations at the preferred times and places rather than postponing operations until the formal sustainment base has totally "geared up" to support the forces.

Scavenging is not dependent upon automatic data processing (ADP) like the traditional sustainment system (although scavenging can become automated). Scavenging does not come to a halt when a force is subjected to electromagnetic pulses (EMP), although complex ADP devices may cease to be effective.

Scavenging can provide uncontaminated materiel in a nuclear-chemical environment. This becomes critical when considering the reconstitution of tactical forces. It is plausible that reconstitution units be equipped and supplied with uncontaminated scavenged items such as food, small arms, explosives, mines, antitank weapons, wheeled vehicles, engineer items, fuels, and

medical supplies. Besides deceiving the enemy as to our capability to reconstitute combat power, scavenging may promote other deception operations. Bogus and dummy CSS facilities composed of non-essential scavenged assets can be advertised to the enemy while the real CSS locations and strengths remain hidden. This may confuse the enemy as to our actual tactical intentions.

Scavenging can be an intelligence gathering bonanza with operational and even strategic implications. For example, data plate entries on captured weapon systems can provide target locations of enemy depots and factories. Captured equipment can be analyzed for vulnerabilities that our tactical forces can exploit, or may reveal new designs and techniques in manufacturing which the U.S. may emulate.

From a protection viewpoint, scavenging facilitates the defense of CSS activities. Captured antitank weapons and machine guns can be used to protect convoys and vulnerable logistical nodes. Civilian warehouses and other facilities provide passive defense from enemy observation and targeting. This in turn encourages better sustainment of forces in combat.

Scavenged materiel such as food, captured uniforms, clothing, and tools can be used for prisoners of war (POW's), displaced persons (DP's), and civilians.⁶⁹ It is plausible that a commander will have the additional burden of feeding, housing, transporting, and caring for these groups of people for some period of time. Scavenged items with no immediate value to the battle can be earmarked to support this effort.

Depending on the circumstances, the most critical resource for battlefield sustainment is transportation. Scavenged transportation assets can be used to distribute personnel, dry cargo, petroleum products, and water by roads, rail lines, waterways, and even by air. Scavenged transportation assets can lessen the dependence upon any single LOC and upon any single type of conveyance. Conceptually, units can attain 100% mobility through scavenging. For example, a combat support hospital can be equipped with sufficient vehicles and trailers to enable it to move about on the battlefield without the normal dependence upon external sources. In heavy corps and divisions, fuel storage and transport present awesome challenges; scavenged conveyances can help solve both. Appendix A portrays a concept whereby scavenged fuel tankers assist corps organic and attached assets in providing fuels to corps major subordinate commands (MSC's). In a similar manner, scavenged transportation assets can remedy the lift capability requirement for ammunition at the tactical level.

The previously highlighted benefits provide justification for incorporating scavenging into tactical plans and operations. As stated earlier, certain costs are incurred when scavenging is employed and these costs vary with the degree of commitment to scavenging.

Costs

There is an old saying that "nothing of value comes cheap". The scavenger logistics concept appears to lend credence to this time-honored saying. A tactical organization can fully capitalize upon scavenging only if it is willing to plan, organize,

and train for it; otherwise, opportunities will pass it by to no avail.

Commanders from corps down to company, troop, and battery level must place command emphasis on scavenging. Commanders must not find comfort in the adage "Don't worry about logistics, Sir, it will be there when we need it." Genuine command involvement is the initial and principal cost in establishing a credible scavenger logistics approach to sustainment.

Tactical and logistical planners must tailor their CSS organizations so as to be conducive to scavenger operations. Recovery and evacuation teams must be incorporated throughout the force. Maintenance contact teams must be highly trained, mobile, adequately supplied with critical repair parts and diagnostic devices, and capable of communicating with their parent units. Collection points must be established from battalion to corps level to accommodate damaged and abandoned friendly or enemy equipment. Brigades and divisions need CSS augmentation in order to scavenge the battlefield rapidly. The corps support command (COSCOM) will possibly request augmentation from theater. All levels from brigade to corps require host nation liaison assistance, if available, to coordinate and obtain supplies, equipment, and services from local sources.

The COSCOM must be tailored to accommodate scavenging. It does so through the attachment of selected CSS units with missions and capabilities that complement scavenging. One would expect a wisely structured COSCOM to possess at least one property disposal organization, a collection and classification organization, an

ordnance disposal unit, and a labor service organization for safeguarding scavenged stocks. In addition, the COSCOM bolsters scavenging with designated supply, transportation, and maintenance units along with the materiel management center and movement control center.

Corps headquarters assist scavenging by providing civil affairs (CA) units and teams to various logistical and tactical headquarters. A tactical technical intelligence unit is also involved in the scavenging process with the mission of providing assistance to tactical commanders through the selective examination, evaluation, and classification of technical information derived from the exploitation of foreign materiel and facilities.⁷⁰ Corps military police units are also active in scavenging. Each of these aforementioned units exist today within the U.S. Army, and our corps contain most of them. With few adjustments, our corps can be reoriented fully to exploit scavenger logistics. This tailoring of organizations to meet the scavenging needs of the force is, therefore, the second major cost.

The third major cost deals with coordination. Scavenging demands coordination within and between organizational staffs in an effort to synchronize the formal sustainment system with scavenging. The S1/G1 is involved in manpower issues. The S2/G2 is involved in the analysis of captured enemy materiel. The S3/G3 is establishing priorities and missions for major forces. The S4/G4 is responsible for the disposition of captured enemy materiel, excess, surplus, and salvaged supplies. In addition the S4/G4 identifies requirements for use of local inhabitants,

enemy POW's, and civilian internees/detainees in logistic support areas. The G5/CA team determines the availability of local personnel, materiel, and services, and coordinates their acquisition. At COSCOM level, the assistant chiefs of staff for personnel (ACSPERS); materiel (ACSMAT); transportation (ACSTRANS); services (ACSSVCS); security, operations, training and intelligence (ACSSOTI); and civil military operations (ACSCMO) must all coordinate ongoing and future scavenging efforts among themselves, with the corps staff, theater agencies, corps major subordinate commands, and host nation authorities. This complex coordination scheme enhanced by a judicious distribution of liaison personnel must exist totally to synchronize corps-wide scavenging.⁷¹

The last major cost revolves around training of our tactical forces in peace to excel at scavenging during combat. To be totally effective, scavenging must become as instinctive as small unit drills. Soldiers and leaders must immerse themselves in a training/learning environment with the objectives of developing imagination and resourcefulness combined with the rediscovery of World War II scavenging lessons learned. Scavenging techniques need to be developed and practiced from squad level through corps. Logisticians at all levels must validate methods of support. Divisions and corps could distribute pocket-size scavenging handbooks. Small unit leaders, especially noncommissioned officers, must be educated in the significance of combat scavenging. Emphasis on reconnaissance patrolling and reporting should be rekindled in combat, CS, and CSS units alike. Units

could train to refuel vehicles using newly developed captured fuel pumps and captured fuel test kits.⁷² Units must designate and train recovery squads while on field training exercises (FTX's) to "police" the AO for abandoned, lost, and "enemy" materiel. CSS standing operating procedures (SOP's) need to include provisions for searching aid stations, hospitals, and collection points for surplus weapons, binoculars, watches, and ammunition.⁷³ Forward support battalion (FSB), DISCOM, and COSCOM commanders must ensure that SOP's encourage scavenging and that training reflects appropriate command emphasis. CS/CSS units should establish anti-armor gunnery programs using U.S. and foreign-made weapons.⁷⁴ Interoperability training must be stressed to familiarize U.S. soldiers with foreign equipment. Divisions and corps should conduct area studies of likely AO's, paying particular attention to civilian assets available for military use (See Appendix B).⁷⁵ Corps and divisions could prepare technical intelligence plans for likely AO's as well.⁷⁶ Pertinent scavenging instructions must be delineated in the logistics portions of tactical SOP's; estimates; administrative/logistic plans and orders; CSS annexes; and paragraph 4, Service Support, of operations orders.⁷⁷

Soldiers and leaders should receive training on methods of requisitioning from the local population. In this case, leaders must understand that practically everything may be requisitioned that is necessary for the maintenance of the force, such as food, fuel, clothing, building materials, machinery, tools, and vehicles.⁷⁸ Each leader must understand that requisitions and

services are demanded on the authority of the local commander; prices for items and services requisitioned should be fixed and paid promptly with receipts issued; and while coercive measures are allowed, they must be limited to the minimum necessary to secure the articles requisitioned.⁷⁹ In this vein, leaders must be aware of the various means of reimbursement - foreign currency, legitimate IOU's, prearranged agreements, and bartering. Soldiers and leaders must be educated as to what constitutes looting so as to avoid it. Looting is the unsanctioned seizure of goods and services by force for private or personal gain. Individuals who participate in either looting, blackmarketing, or fraud must be promptly and appropriately punished.⁸⁰

In the main, scavenging is no panacea for tactical sustainment; however, it offers advantages that cannot be overlooked. Depending on the degree to which scavenging is conducted and on the level of command that practices it, certain costs exist. Conceivably, an entire operation can be built around the need to scavenge local or captured stocks. With this in mind, proficiency in scavenger logistics is attained only through thorough training while in peace; war will be too late to install procedures and attitudes that produce total exploitation.

VI. Conclusion

Modern day scavenging is a proactive mechanism for recycling combat power in times of need. For the future, scavenging has tremendous potential and training programs should reflect its importance. For example, U.S. forces could train on Warsaw Pact

equipment and weapons. The Army could equip regular units, especially CS and CSS units, stationed outside the U.S. with locally procured equipment. RC and regular CS/CSS units might deploy to Europe for Reforger and to Korea for Team Spirit exercises without their equipment. Once they arrive, each unit draws and operates a set of locally procured equipment. Army units could operate vehicles periodically on Soviet quality fuels. Army personnel should receive extensive hands-on training with assorted allied systems so as to be capable of operating allied equipment. These are but a few proactive applications of the scavenger logistics approach.

As in past wars, scavenging remains a valid means of satisfying periodic sustainment shortfalls at the tactical level. It provides the tactical commander a means of moving further and faster than his enemy while magnifying the enemy's uncertainty and confusion. Scavenging prolongs the combat power of a tactical force even when isolated on the battlefield. Based on the foregoing assessment, the employment of scavenger logistics is a viable alternative and supplement to future tactical sustainment operations; however, it cannot totally replace the formal sustainment system. The greatest payoff occurs when scavenging and the formal system are employed together in a synchronized, complementary fashion.

The scavenger logistics concept derives strength from its roots in the simple eternal nature of war rather than some modern form of wizardry. It represents our Army's accumulated wisdom gleaned from past wars, and in many cases, relearned because the

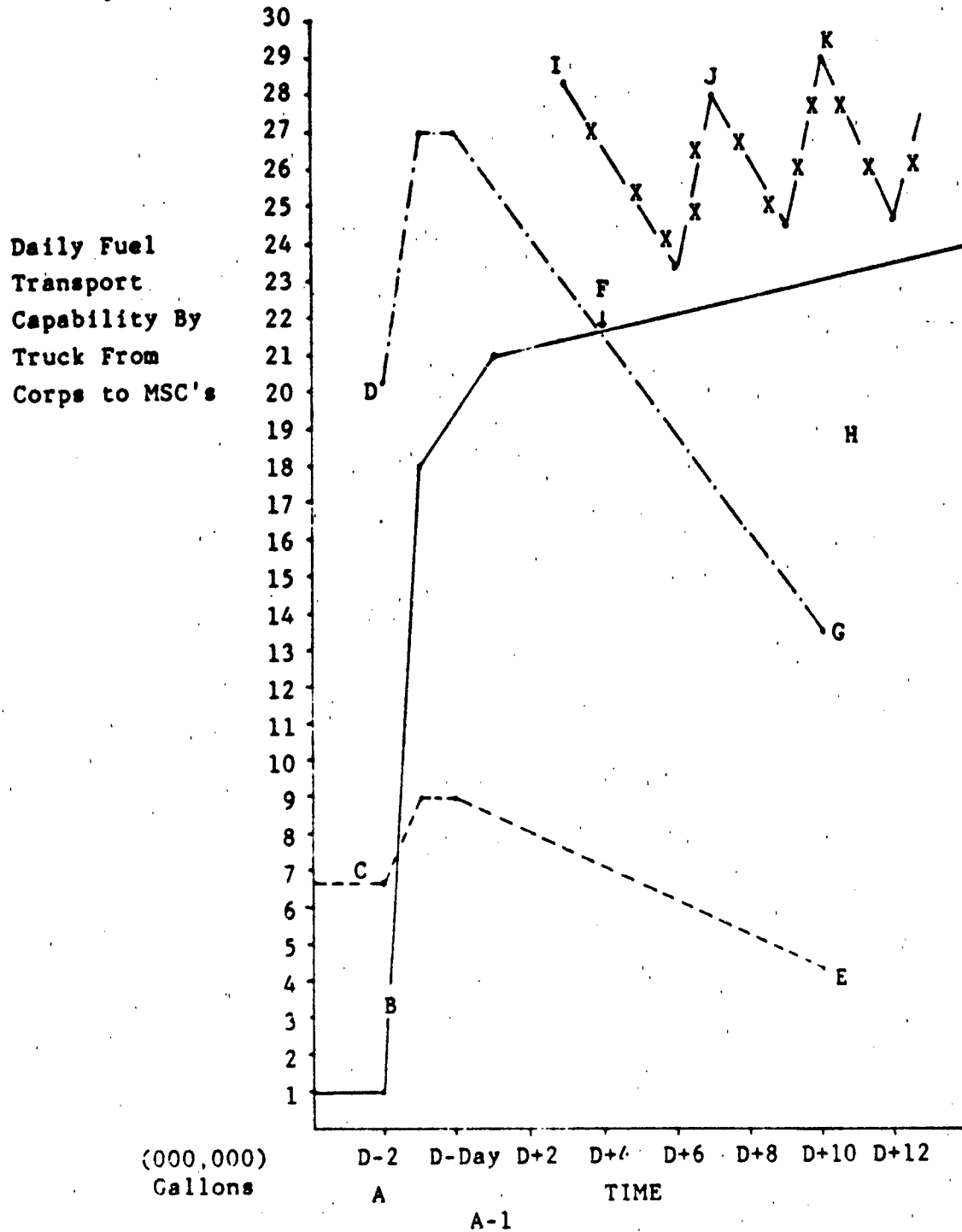
lessons were never institutionalized.⁸¹ Truly to exploit scavenging, all soldiers must be sensitized as to its value. This does not mean that scavenging will in itself guarantee victory; however, failure to employ it may easily increase the possibility of defeat, or at least make success more difficult.

The central point may be that events, not preferences, are leading the U.S. Army to adopting the concept of scavenger logistics in that peacetime CSS austerity implies wartime shortages of high value weapon systems, munitions, fuels, repair parts, transport, and more. The exigency of responding rapidly to a crisis with a tactical force opposed by an enemy that possesses modern weaponry is likely. The likelihood of fighting on a non-linear battlefield becomes more of a reality as time passes. This "simultaneity of events" supports the need for proficiency in scavenging. Being a sustainment accelerator, scavenging serves to generate and regenerate combat power either directly or indirectly. Scavenging, at last, can be the rekindled spark that translates logistics into superior combat effectiveness on the next battlefield. In the words of General Waldemar Erfurth:

A commander who fails to accept warnings, facilitates the winning of a great victory - for the enemy.⁸²

APPENDIX A

Conceptual Wholesale Fuel Transport Requirement and Capability Scenario for a Heavy Corps in a Maturing Theater



Appendix A (continued)

Assumptions:

1. This hypothetical corps will receive 48 hours notice before hostilities commence.
2. The U.S. military fuel tankers will each have a 7,500-gallon capacity rather than 5,000 gallons (The Army plans to field new 7,500-gallon tankers.).
3. Scavenged civilian fuel tankers will each have a 10,000-liter or 2,642-gallon capacity.
4. Bulk fuels will be delivered to corps major subordinate commands by corps 7,500-gallon tankers only (Rail tank cars are intentionally left out of this analysis for instructional purposes only.).
5. Each wholesale petroleum tanker will complete two round trips per day.
6. Corps will have fuels to load in tankers at origin.
7. Time Phased Force Deployment List (TPFDL) medium truck companies (POL) will not have arrived in corps sector during this time frame.
8. Civilian tankers will be available in the AO.
9. The wholesale tanker fleet will experience a five percent loss rate daily beginning on D-Day.
10. The wholesale tanker fleet will operate at maximum capability once alerted.
11. Operators, either military or civilian, will be available.
12. TRANSCOM will provide two medium truck companies (POL) to corps at D-2.
13. This hypothetical corps will consist of one mechanized division, one armored division, a corps combat aviation brigade, an armored cavalry regiment, two field artillery brigades, an air defense brigade, an engineer brigade, a military intelligence group, a military police brigade, a signal brigade, and a COSCOM.
14. The COSCOM will have trained petroleum handling personnel and adequate support equipment to load and discharge commercial tankers.

Appendix A (continued)

Explanation:

A--Corps is alerted at D-2. MSC's deploy in preparation for hostilities.

B--Prior to D-2, the corps level, wholesale requirement to transport fuel by tanker is approximately 100,000 gallons/day, well within the capability of the single COSCOM medium truck company (POL). Upon alert, the corps wholesale transport requirement immediately rises to approximately 1,800,000 gallons/day, then continues to rise as hostilities progress.

C--The one COSCOM medium truck company (POL) sustained capability at 75% vehicle availability equates to 675,000 gallons/day; at maximum rate, 900,000 gallons/day (D-1 through D-Day). Once hostilities begin, the unit loses 5% of its tankers daily, or 60 tankers times .05 equals a daily loss of 3 tankers.

D--Transportation command (TRANSCOM) provides two medium truck companies (POL) to assist corps at D-2. This increases the corps wholesale tanker fleet's maximum capability to 2,700,000 gallons per day as of D-1. Upon D-Day, the combined fleet loses 5% of its tankers daily, or 180 tankers times .05 equals a daily loss of 9 tankers.

E--By D+10, the COSCOM medium truck company will be at 50% effectiveness with 30 wholesale tankers operational.

F--At D+4, wholesale fuel requirement exceeds military tanker fleet capability. Corps operations are jeopardized by lack of wholesale fuel transport capability.

G--By D+10, the entire military tanker fleet will be at 50% effectiveness with 90 wholesale tankers operational.

H--Petroleum sustainment gap prevalent. Beginning at D+4, corps tactical operations are seriously impaired until petroleum distribution situation is rectified.

I--Corps and COSCOM planners anticipate the wholesale fuel distribution problem and scavenge one hundred 10,000-liter fuel tankers and begin operating them on D+3. Total fleet wholesale capability on D+3 equals approximately 2,800,000 gallons/day. Due to 5% loss rate, the total fleet capability decreases through D+6.

J--On D+7, scavenged tanker fleet increases to two hundred tankers. Total fleet capability increases to approximately 2,800,000 gallons/day, well above the daily requirement. Fuel not needed each day is stored in civilian tankers in anticipation of surge

Appendix A (continued)

requirements. Due to 5% loss rate, the total wholesale fleet capability decreases through D+9.

K--On D+10, scavenged tanker fleet increases to three hundred tankers. Total fleet capability increases to approximately 2,900,000 gallons/day. This process continues until no longer necessary. The key is to maintain a petroleum wholesale transport capability that satisfies the corps requirement on a daily basis.

Major Points:

1. One medium truck company (POL) satisfies this corps' peacetime, routine requirements; however, it does not meet surge requirements that exceed 900,000 gallons/day.
2. The two additional companies provided by TRANSCOM on D-2 are extremely helpful; however, there must be a TRANSCOM with at least two medium truck companies for this assistance to become reality.
3. If host nation civilian tankers are plentiful, hopefully prearranged support will be provided to the corps. If not prearranged, civilian tanker support will be difficult to orchestrate, but not impossible.
4. If the corps has acquired towing pintle conversion kits that allow U.S. prime movers to tow host nation commercial fuel trailers, then any 5-ton vehicle or larger can become a fuel transport vehicle. Application of this concept can also be useful in meeting the ammunition transport requirements of the corps. For example, a M900-series, 5-ton cargo vehicle can transport 10 tons of cargo in its cargo bay on-highway. The vehicle has the capability of towing an additional 15 tons. If the cargo vehicle pulls a commercial trailer that weighs five tons, then ten tons of cargo can be hauled in the trailer for a total of ten tons in the cargo truck and ten tons in the trailer. This combination doubles the capability of the vehicle from ten tons to twenty tons.
5. Fuel tankers and line haul trailers, in general, become critical items of equipment during hostilities. While in convoys or at transportation nodes, these trailers and their cargos are vulnerable to destruction. Scavenged trailers can reduce the impact of losing organic trailers. The 5% daily loss rate of tankers may be too generous to the U.S.
6. Anticipating sustainment shortages and taking preventive actions are key to providing continuous support to tactical operations.

Appendix A (continued)

7. Scavenging fills the gap until TPFDL units arrive.

8. Although this concept uses scavenged tankers only for whole-sale fuel distribution, scavenged tankers have utility at the retail level also. For example, the military police brigade can use civilian tankers as mobile fuel points for its subordinate units. In addition, the COSCOM's combat support hospitals can use civilian tankers to store fuels in support of medical operations. Divisions can use civilian tankers to store reserve fuels in anticipation of surge requirements. Conceivably, a M1 Abrams tank can tow a civilian tanker as long as the combination stays on a hard surface road.

APPENDIX B

Assets to Scavenge

Command, Control, and Communications (C³) Assets:

Abandoned communications assets
Captured communications assets
Communications networks (radio, television, telephone, telegraph, newspaper)
Computer distributors/outlets
Copiers/duplicating/facsimile services
Local police/fire departments
Office supply firms
Power plants/utilities
Seats of local government (files, blueprints, maps, command posts)
Telephone books
"Yellow Pages"

Decontamination Assets:

Abandoned NBC equipment and supplies
Captured NBC equipment and supplies
Car washes
Dairy tankers for water transport
Fire hydrants
Fire stations and equipment
Health spas/clubs
Hose distributors
Recaptured decontamination equipment
Steam cleaners
Swimming pools
Water pumping stations
Water sources (public/private)

Dry Storage Assets:

Abandoned storage assets
Barges
Captured storage assets
Container handling equipment (CHE)
Containers
Container terminals
Forklifts
Railcars
Rail yards
Truck terminals
Warehouses

Engineer Assets:

Abandoned engineer equipment
Abatis

Appendix B (continued)

Engineer Assets (continued):

Barges (field expedient bridging)
Captured engineer equipment and supplies
Cement/concrete suppliers
Construction companies and their files
Construction equipment supply companies
Crane suppliers and their files
Culvert pipe distributors
Dredging companies
Drilling companies
Equipment rental companies and their files
Explosive distributors and their files
Farm equipment companies
Fence suppliers
Fertilizer dealers/plants
Fireworks manufacturers
Forested areas
Forklift dealers
Hardware stores
Logging companies
Lumber yards
Masonry supply companies
Quarries/mines
Recaptured engineer equipment and supplies
Rock crushing facilities
Sawmills
Snow removal equipment

Health Services Assets:

Abandoned medical facilities and supplies
Beauty/barber shops
Captured medical facilities and supplies
Clinics
Cold storage facilities
Dental equipment and supplies
Dormitories
Drug dealers and suppliers
Hospitals
Hotels
Ice plants
Laundries and cleaners
Medical supply companies
Mortuaries
Mortuary supply companies
Nursing homes
Optical shops and suppliers
Recaptured medical facilities and supplies
Schools

Appendix B (continued)

Health Services Assets (continued):

Transferred medical supplies and facilities
Trucks and trailers for mobile hospitals
Veterinary supply companies

Maintenance Assets:

Abandoned maintenance facilities/equipment
Air conditioning repair facilities
Appliance repair facilities
Assembly plants
Cable suppliers
Camera shops
Captured maintenance facilities/equipment
Clock repair shops
Computer repair shops
Electrical supply firms
Engine repair shops/distributors
Factories and foundries
Hardware suppliers
Heavy equipment transport companies
Industrial supply firms
Machine tool and supply companies
Paint suppliers
Parts suppliers
Radio repair shops/suppliers
Recaptured maintenance facilities/equipment
Refrigeration/heating repair shops
Service stations
Television repair shops/dealers
Terminal maintenance facilities (marine, truck, bus, rail)
Textile manufacturers/suppliers
Tire distributors
Towing truck companies
Vehicle maintenance shops
Welding equipment and supply companies

Petroleum Assets:

Abandoned fueling systems and stocks
Captured fuel facilities and stocks
Coal yards
Dairies for tankers
Liquid and compressed gas distributors
Liquid carrying containers
Pipelines and pumping stations
POL distributors*
POL rail tank cars and discharge facilities
*POL-acronym for petroleum, oils, and lubricants

Appendix B (continued)

Petroleum Assets (continued):

POL storage farms
POL truck terminals
POL underground storage facilities
Recaptured fuels and fueling equipment
Refineries
Service stations
Transferred fuel from unit to unit
Transferred fuel from vehicle to vehicle

Subsistence Assets:

Abandoned subsistence items, including water
Bakeries
Bottlers and distilleries
Captured subsistence items, including water
Cold storage facilities
Farms
Feed lots
Grocery stores
Grocery suppliers
Ice plants
Meat packers
Orchards
Ranches
Refrigerated vans
Restaurants
Stockyards
Water purification systems
Water sources

Transportation Assets:

Abandoned transportation assets
Airfields/aircraft
Air traffic control facilities
Auto dealerships/repair shops
Barges
Barge terminals
Boat dealerships/manufacturers
Buses
Bus terminals
Canals, locks, navigable waterways
Captured transportation assets
Container handling equipment
Containers
Conveyor systems
Cranes
Flat sections of highways for airstrips

Appendix B (continued)

Transportation Assets (continued):

Forklift dealers
Harbor pilots/vessels
Highway repair vehicles
Highways
Highway tunnels
Maps
Motorcycle dealers
Parts stores/distributors
Railheads, rail lines, rolling stock, sidings, spurs, subways
Railroad bridges, tunnels, yards
Recaptured transportation assets
Refuse disposal companies
Salvaged transportation assets
Secondary roads
Snow removal equipment
Taxi companies
Trailer dealers/manufacturers
Trailer hitch suppliers
Truck dealers, truck stops, truck terminals

Miscellaneous Assets:

Abandoned weapon systems, other major end items, supplies,
clothing
Canvas and tentage suppliers
Captured weapon systems such as artillery pieces, chemical and
nuclear ammunition, trucks, tanks, antitank weapons, machine
guns
Department stores
Fire and safety equipment distributors
Generators
Labor services (POW, military, civilian)
Sporting goods stores
Straggler lines for displaced soldiers
Transferred materiel from other units
Transformers

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